

## Chapter 2.8 REGIONAL WATER QUALITY INITIATIVES

### NORTHERN VIRGINIA REGIONAL OFFICE (NVRO)

- **Probabilistic Biomonitoring and Chemical Monitoring Program in Virginia Non-Tidal Streams**

The Northern Virginia Regional Office (NVRO) sampled six (6) randomly selected probabilistic non-tidal stream stations in the Piedmont and Coastal Plain ecoregions. The Regional Biologist gathered representative samples of benthic macroinvertebrates, performed comprehensive habitat assessments, and obtained DO, temperature, pH, and conductivity data at the six stations located in the Northern Virginia Region. Each biological station was sampled twice, once in the spring and again in the fall. Fall sampling included water quality samples for nutrients, solids, chlorophyll a and fecal coliform bacteria. All sampling was conducted in accordance with agency standard operating procedures for ensuring the quality of the data. New, probabilistic stations will be selected each year.

- **Total Maximum Daily Load (TMDL) Activities**

Highlights of the NVRO efforts to improve water quality in those streams segments that do not currently support designated beneficial uses have been grouped into three categories and are presented below.

#### Monitoring in Support of TMDL Development

The NVRO established 23 special study water quality monitoring stations on selected streams identified in the 1998 303(d) Total Maximum Daily Load Priority List and Report. The special studies were designed to provide monitoring data to help better define the impaired stream segments and to support TMDL development. Stations were sampled monthly between July 1999 and August 2000. Each sampling event included water quality samples for nutrients, solids and fecal coliform bacteria.

#### Completed and Planned TMDLs

Fecal coliform bacteria TMDL's have been developed and submitted to the U.S. Environmental Protection Agency (EPA) for seven impaired stream segments in Northern Virginia Region. A fecal coliform bacteria TMDL for Mountain Run (near Culpeper, Virginia) was approved by EPA on April 27, 2001. Fecal coliform bacteria for Accotink Creek (Fairfax County), Four Mile Run, Arlington and Fairfax Counties and the Cities of Alexandria and Falls Church), North Fork, South Fork and mainstem Catoctin Creek (Loudoun County), and Thumb Run (Fauquier County) were submitted to EPA and were all approved on May 31, 2002. Fecal coliform bacteria TMDLs are currently being developed for six impaired segments in the Goose Creek watershed (Fauquier and Loudoun Counties) and will be submitted to EPA in December 2002. In addition, Fecal Coliform TMDLs for eight other impaired waterbodies are being recommended for de-listing based on improvements in water quality.

#### Public Participation in TMDL Development

NVRO has made every attempt to go above and beyond the required elements of public participation in TMDL development. Technical Advisory Committees (TACs) consisting of local government representatives and stakeholders have been established in most watersheds to provide a forum for review and approval of technical information used and assumptions made in developing the TMDL. TAC meetings have been held in addition to the public meetings required under state regulations. In several cases, a third and sometimes fourth public meeting have been held in addition to the two required meetings to help keep the public informed of and encourage public participation in the TMDL development process. Extensive mailing lists have been developed, in some cases numbering in the hundreds of names, and used to help notify watershed stakeholders of upcoming meetings. Finally, comment periods have been extended whenever practicable to provide as much time as possible for the submittal of public comments. In the densely populated Northern Virginia area, DEQ feels that it is especially important to insure public involvement in the TMDL process.

- **Lake Anna Monitoring**

The DEQ Citizen Monitoring Coordinator and the NVRO have met with representatives of the Lake Anna Civic Association (LACA) to develop a coordinated water quality monitoring plan for Lake Anna. The LACA organized a Water Quality Program in July 2000, which began monitoring 13 sites on the lake beginning in February 2001. This LACA monitoring program has since expanded to 20 sites. DEQ has

conducted its own water quality monitoring on the lake. These two monitoring programs have historically been conducted without coordination. In the Winter/Spring of 2002, DEQ and the LACA worked to develop a monitoring plan for the lake that will be implemented using the combined resources of the NVRO and the citizen volunteers. This combined monitoring effort began in April 2002, with the first “coordinated” lake-sampling event taking place. The monitoring plan will incorporate a three-year sampling rotation where DEQ will monitor approximately one-third of the sites on the main lake each year. The LACA volunteers will monitor those lake stations that DEQ does not sample. The collaborative monitoring effort will allow more extensive lake water quality monitoring than could be achieved individually by either the DEQ or the LACA. DEQ monitoring is conducted in accordance with the DEQ lake-monitoring guidance, and the LACA citizen monitoring is conducted in accordance with a DEQ-approved quality assurance plan.

## **WEST CENTRAL REGIONAL OFFICE (WCRO)**

- **First Annual Virginia Tech Farm and Family Showcase (2001)**

The First Annual Virginia Tech Farm and Family Showcase was held September 5<sup>th</sup> and 6<sup>th</sup> 2001 at Virginia Tech's Kentland Farm. The portion of the Farm & Family Showcase in which DEQ participated focused on water quality issues associated with agriculture. Specifically, the riparian zone along Toms Creek flowing through the VT farm has been incorporated into the *Tom's Creek Streamside Conservation Project*, which showcases 'cost share' best management practices available to area farmers and landowners as both pollution prevention (P2) opportunities and Total Maximum Daily Load (TMDL) solutions. The *Tom's Creek Streamside Conservation Project* is permanent to allow for educational exposure opportunities (4-H, school field trips, etc.). Permanent signage for this area, including a 4x8 redwood sign, identifies all agencies involved and a brief description of the riparian area BMPs. The DEQ provided \$1294.00 to assist in this project. Over 12,500 people visited the Showcase in its inaugural year.

- **PCB Source in Altavista, VA.**

In July of 1998, the Virginia Department of Health issued a fish consumption advisory for certain types of fish in the Roanoke (Staunton) River. Since then, the advisory was extended and now includes a portion of the Dan River main stem. In the fall of 1999, a search for PCB sources in the Roanoke River watershed by DEQ-WCRO uncovered a significant PCB source in Altavista, VA. Sample levels ranged from 5 – 3,000 ppm with the highest concentrations in a storm water ravine that leads off the property and enters the Roanoke R. On December 2, 1999, the DEQ Director ordered the facility to cease discharging PCBs to the river. Detention structures were immediately installed to effect this and strong precautions taken to protect the health of workers at the site. Since that time, the facility has been intensively sampled to characterize PCB contamination and to prepare for remediation. EPA, DEQ-WCRO and a local Citizen Committee continue to work with the facility and contractor to make progress towards cleaning up the site.

- **PCB Source Investigations in Altavista and Hurt, VA.**

During 1998 – 2000, an intense search for PCB sources was conducted in the Roanoke River watershed from Leesville Dam to the head of Kerr Reservoir. This involved extensive interviews of local officials, citizens, industry representatives and employees, and information provided by the Staunton R. Citizen Committee. Based on these interviews, in June of 2000, DEQ teams sampled soil and stream sediment from multiple areas in the Town of Altavista and the Town of Hurt, VA. The collections helped narrow the search for PCB sources. It also identified areas of concern and areas that have acceptable levels PCBs. While most sampled areas did not exceed Toxic Substances Control Act (TSCA) regulatory thresholds, the Town of Altavista STP was found to have a 10 acre wastewater lagoon with sediments above acceptable limits. The Town has hired a consultant to characterize PCB concentrations in the lagoon and its environmental and human risk. EPA and DEQ-WCRO are currently working with the consultant and Town on the project.

- **PCB Source Investigations in the Roanoke River Advisory Area**

During 2001, DEQ-WCRO and DEQ-Central Office planned for and conducted an intensive sampling of discharges in the PCB fish eating advisory area on the Roanoke R. Out of a potential list of 52 dischargers in WCRO, approximately 20 were sampled. All discharges monitored had PCB concentrations below levels of concern.

- **Mill Creek TMDL Study 1999**

Mill Creek is a tributary of the Little River (New R. drainage) in Montgomery County, and is 303(d) listed for fecal coliform bacteria contamination. A study was initiated to characterize the problem and identify sources of bacteria in the watershed. Data have been collected and are being used in the TMDL plan. The bacteria are primarily coming from non-point source agriculture sites in the drainage.

- **Dodd Creek TMDL Study 1999**

Dodd Creek is a tributary of the Little River (New R. drainage) in Floyd County, and is 303(d) listed for fecal coliform bacteria contamination. A study was initiated to characterize the contamination problem and identify sources of bacteria in the watershed. Data have been collected and are being used in the TMDL plan. Sources include several leaking domestic septic systems and agricultural problems.

- **Blackwater River TMDL Study 1999**

Blackwater River is a tributary of the Roanoke River and is a major arm of Smith Mountain Lake. The drainage makes up several 303(d) listed segments and was extensively studied in 1991-95. Two monitoring runs were made through the watershed to provide current data on the status of fecal contamination. The data were summarized for TMDL modeling. In addition, a series of monthly stations in the watershed are being sampled as a part of the Central Office's bacterial indicator study. In addition to the fecal samples we are also measuring flows and nutrients to support TMDL modeling. The monitoring staff will summarize these data.

- **Staunton River Low Flow Study 1999**

Because of the 1999 drought, the dams on Smith Mountain Lake and Leesville Lake discharged less water to maintain pool levels in the reservoirs. The lower flows in the Roanoke River downstream of Leesville Reservoir were a concern. WCRO conducted a study of the low flow conditions. Monthly benthic samples were collected at several sites along the river. Also, five temperature loggers were installed along the stream. The benthic samples are being processed and the temperature data is being summarized.

- **Piedmont Control Station Survey 1999**

DEQ and EPA are developing a new biomonitoring database. Early in the development stage we identified the need for more Piedmont control sites of all size streams. WCRO performed a search for new Piedmont controls though none of the sites appear adequate. A summary of the data was sent to the EPA database contractors.

- **Ongoing Jackson River Dissolved Oxygen Studies**

The Jackson River is one of the primary streams which helps form the James River. It is an exceptional state resource upstream of the City of Covington, VA, but is severely impaired at and below the Rt. 60 Bridge in Covington. For several years we have been monitoring dissolved oxygen levels in the stream and finding dissolved oxygen criteria violations. These data are regularly summarized and reported.

- **Forest Service Biomonitoring Data Review and Documentation 1999**

In 1999, the U.S. Forest Service submitted a large amount of data to DEQ for inclusion in the 305(b) report. Examination of the data indicated several of the streams assessed by the Forest Service as impaired were listed because of lack of flow. WCRO initiated a study of several of these "impaired" sites to determine if they were perennial streams. All of the streams visited were intermittent streams. WCRO

wrote an opinion paper suggesting these data not be used for the 305(b) because it is not the purpose of the 305(b) to list streams because of naturally low flows.

- **Ongoing Lakes Monitoring**

WCRO has five large lakes which are primary recreational waters. We have been sampling these “high value” waters several times a year to track water quality. In recent years these data have proven to be very valuable because of the high public interest and concern over water quality in these lakes. In 1999, we began sampling these lakes six months each year. These data are to be used in future 305(b) reports.

- **Smith River Biomonitoring Studies 1997-1998**

The Smith River has been an area of special interest for several years due to impaired benthic communities and reports of illegal discharges and accidental spills. In 1997, WCRO initiated several studies of the biological community in the vicinity of several discharges in the Martinsville area. These data were used in regular biomonitoring reports and special reports.

- **Smith River Bioaccumulation and Sediment Study 1997-1998**

In 1997, WCRO initiated a study to determine if benthic impairments in the Smith River were due to a bioaccumulative toxic substance. Corbicula were placed in enclosures in the stream below several of the major dischargers to the river. While no bioaccumulative metal or organics were found in the stream, there was significantly higher mortality among Corbicula below the Martinsville and Lower Smith STPs. This can be interpreted to mean there is a toxic problem in the stream but the toxic compound is not bioaccumulative. This would be consistent with an effect caused by Chlorides, which were known to be discharged in high concentrations from both plants. The effect is probably related to the regulated flow from Philpott Reservoir, which discharges extremely soft water. At high flows the STP discharges are diluted with soft water while at low flow the stream is heavily influenced by the discharges.

- **Smith River Fish Shocking 1998-1999**

The Smith River has been biologically impaired for several years. In 1998 we coordinated with the DGIF to conduct a fish community assessment. Due to sampling equipment problems in the stream the findings were not conclusive. However, the community appeared to be less diverse below the Martinsville and Lower Smith STPs. In 1999 we returned with different equipment and found the fish communities below these same plants to be much better than originally believed. Whether the fish community improved between years or the difference was due to better sampling equipment is not known. In 1999 improvements were also seen in benthic invertebrates which were not affected by sampling gear. This report is being prepared by the DGIF.

- **Floyd Temperature Study (1998)**

In 1998, WCRO performed a study of thermal effects of the Floyd STP. No temperature effects were observed in the stream.

- **Fawn Creek TMDL (1998)**

A Total Maximum Daily Load (TMDL) was developed for VPDES Permit VA0063657, Amherst County Service Authority Ivanhoe Forest Sewage Treatment Plant. The facility's permit contains water quality based effluent limits for dissolved oxygen, ammonia and total residual chlorine. The TMDL was developed by DEQ's West Central Regional Office Water Permits group and submitted to the U.S. Environmental Protection Agency (US EPA). Approval was received on June 26, 1998.

- **American Heritage Rivers Initiative (1997-1998)**

In February of 1997, President Clinton announced the American Heritage Rivers Initiative in his State of the Union address. Application guidelines were published in the fall of 1997. A task force of community

leaders from the counties of Ashe and Watauga in North Carolina and Grayson County, Virginia came together to pursue application for the designation of the New River as an American Heritage River.

On July 30, 1998 President Clinton and Vice President Gore traveled to Ashe County to designate the New River an American Heritage River. The New River is now one of fourteen designated American Heritage Rivers in the nation. These initial efforts have grown to encompass the entire New River drainage from North Carolina through Virginia to West Virginia. The American Heritage River designation means grass roots organizations and communities in the New River Basin are afforded streamlined access to federal resources to develop and seek funds for projects related to economic revitalization, agriculture, natural resource and water quality protection, historic and cultural preservation and education. Streamlined access is accomplished through communications with and assistance from the New River Community Partners Board and the River Navigator.

The New River Valley Planning District played a major role in coordinating and conducting public meetings in Virginia to bring community and civic leaders and local and state representatives together to develop a watershed plan. A completed work plan for the entire New River was formally released on July 26, 1999. DEQ staff participated in this community process.

- **Priority NPS Watershed Monitoring for Water Quality (1997)**

A 604(b)-funded special study was conducted in two watersheds located in the Roanoke Valley. Water quality variables were intensively monitored over four months. Watersheds L04R and L05R were both reported as having high potential for urban non-point source (nps) and low potential for agricultural and forestal nps pollution (1996 305(b) Report, VA DEQ). The study found reported potentials were only partially correct. Urban impacts were detected in both watersheds, particularly L05R but unreported agricultural impacts were also detected in L05R. In addition, three of the four main creeks sampled exhibited sufficient total fecal coliform bacterial exceedances to be classified as impaired for the primary contact use.

## **PIEDMONT REGIONAL OFFICE (PRO)**

- **Coastal 2000 Initiative - Water Quality, Biomonitoring and Sediment Toxicity of Virginia Estuaries**

PRO and TRO sampled 47 randomly selected probabilistic estuarine stations on the western and eastern Chesapeake Bay shores and the oceanside of the Eastern shore in summer 2001. Sampling crews obtained filtered chlorophyll a and nutrients, particulate nutrients, total suspended solids, benthic infauna, sediment metals, organics, particle size, and toxicity samples, light attenuation data, and depth profiles for DO, temperature, pH, conductivity and salinity. Each station was sampled once. Field duplicate samples were collected at one station per run, to cover 10 percent of samples for each parameter. Hydrolabs were pre- and post-calibrated and maintained according to agency SOPs. The study is proposed to continue for four years, with new stations selected each year. Probabilistic studies answer questions such as "What percentage of Virginia estuaries have low dissolved oxygen?" First year results are pending.

- **James River Combined Sewer Overflow (CSO) Special Study, 1994 through October 2001**

PRO performed a special study to document changes in the fecal coliform bacteria and dissolved oxygen levels above and below CSO outfalls in James River Park and the tidal James River at Richmond, VA from 1994 through 2001. An enlargement of the CSO lines and a south channel diffuser, a major improvement in the CSO system through the Fall line, went online in winter 1998. PRO sampled 14 non-tidal sites through the Fall line, and 16 tidal stations from Richmond downstream to just above the mouth of the Appomattox River, twice per month from May through October each year. A final report is pending.

- **Lead and Other Metals in Sediments of the Tidal Fresh James River near Rocketts Landing / Grantham Property below Richmond, VA.**

PRO waste staff discovered a large battery disposal area beside the James River at Rocketts Landing, lat 37 30 56, long 77 25 01, in early September 2000. An Environmental Site Assessment of the property

documented soil lead levels up to 48 percent adjacent to the river. The study sampled lead and other metals in estuarine river sediments from both near-shore and near-channel sites. Ten (10) sediment samples were obtained by Petit Ponar dredge immediately off the center of the battery site, and at locations at incremental distances upstream and downstream of the site. PRO sampled the stations once during Fall / Winter 2000/2001. Duplicate samples were collected to cover 10 percent of stations.

**Results:** Lead (Pb) in sediment ranged from 21.9 ppm 80 meters below the Rocketts Landing site up to 502 ppm for the sediment sample 200 meters below the Rocketts Landing battery site, and 302 ppm directly off the battery site. Both of the latter concentrations exceeded the ER-M value for lead of 218 ppm. The ER-M (Effects Range – Medium) is a part of the Effects Range sediment quality guidelines established by the NOAA. The guidelines were developed to identify concentrations of contaminants associated with biological effects in laboratory, field, or modeling studies. The ER-M is the concentration equivalent to the 50<sup>th</sup> percentile of the compiled study data. Sediment concentrations above the ER-M are frequently associated with adverse effects on animals that live in the sediment. This segment of the James River below Richmond, VA is considered threatened for aquatic life use in the year 2002 assessment cycle based on these sediment lead findings.

Station	Description	Pb, mg/kg (ppm)
2-JMS109.77	James River 0.2 mi below I-95	29
2-JMS109.47	James River DS of City Locks	52.4
2-JMS108.92	James River opposite Richmond STP	86.3
2-JMS108.77	Upstream boundary of battery site	67.8
2-JMS108.76	James R off Rocketts Landing battery site	308 (ER-M viol.)
2-JMS108.74	Downstream boundary of battery site	51.7
2-JMS108.71	James River 80 m below Rocketts Landing	21.3
2-JMS108.63	James River 200 m below Rocketts Landing	502 (ER-M viol.)
2-JMS108.44	James River 515 m below Rocketts Landing	39.5
2-JMS106.35	James River opposite DDS SIMS metal	45.9

- **Five Menhaden Fish Kills in the Mobjack Basin, July - August 2001**

PRO investigated five fish kills in the Mobjack Bay area from July 9 to August 16, 2001. The fish were juvenile menhaden in the 2 to 3 inch size class. The kills occurred in Heywood Creek in the Severn River (1000+ fish) on July 9, Back Creek in the North River (40,000 fish) on July 14, an unnamed tributary of Wilson Creek in the Ware River (50,000 fish) on July 18, Put In Creek in the East River near Mathews (440,000 fish) on July 30 and again in Put In Creek (3000 fish) on August 16.

Each event involved large schools of juvenile menhaden swimming into shallow headwater coves on flood tides in the evening, and remaining through ebb tide during the night, with mortality caused by depleting the dissolved oxygen, until the fish kills were discovered at morning. There were no lesions on the fish. Menhaden are known to be especially prone to low dissolved oxygen kills. PRO sampled for nutrients, chlorophyll a, biochemical oxygen demand, solids, algae ID, and *Pfiesteria* DNA probes in each event. *Pfiesteria* DNA probes were negative for *Pfiesteria* and related dinoflagellate algae in each event.

- **Commonwealth of Virginia *Pfiesteria* Response and Monitoring Program**

For the months of May through October during the years 1998 through 2001, DEQ collected water quality and algae samples at up to 20 Cohort stations and 22 water quality stations in support of the Virginia Department of Health Cohort study. This combined medical and environmental study investigated whether a relationship could be found between health characteristics of persons working on Virginia estuaries and estuarine water quality. DEQ collected a full range of water quality analyses - including dissolved, particulate and total phosphorous and nitrogen, urea, chlorophyll a, biochemical oxygen demand, total suspended solids, total organic carbon, and *Pfiesteria*-Like Organism (PLO) algal cell counts and identification performed by Old Dominion University. In 2000 and 2001 staff also sampled for *Pfiesteria* and other harmful aglal bloom species by DNA probe identification, with the analysis performed by the Virginia Institute of Marine Science (VIMS). In 2000 and 2001, DNA probes identified *Pfiesteria* and related algal species in low concentrations in the Pocomoke, Coan, North, and East Rivers; and in Mattox, Indian, Skiffes, Kings, Occahannock, Onancock, and Pungoteague Creeks; and in Hodges Cove.

The DNA probe cannot identify whether the species found are in toxic life stages. Agency staff also responded to fish kill events possibly caused by *Pfiesteria*. Most were juvenile menhaden kills attributed to low dissolved oxygen and stranding overnight at low tide, in most instances no lesions were observed on these fish, PLO counts were low, and DNA probe results were negative. VIMS also concurrently performed fish trawls for the cohort study.

- **Three Dinoflagellate Algae Blooms Followed by Fish and Crab Kills in Potomac Embayments in summer 2000**

PRO investigated three dinoflagellate algae blooms which caused multi-species fish and/or crab kills in Potomac embayments in Westmoreland and Northumberland Counties in summer 2000. The first bloom occurred from late April through mid-May 2000, and was dominated by the dinoflagellate Prorocentrum minimum, a non *Pfiesteria*-like algae that causes mahogany water color during a bloom. The bloom was found in Monroe Bay, Mattox, Nomini, Lower Machodoc Creeks, Yeocomico and Coan Rivers and smaller tributaries. The bloom was also documented in the Potomac River from below Morgantown Bridge to the mouth. In its early stages, the bloom elevated dissolved oxygen (DO) to 15 mg/l and pH to above 9, and as the bloom died in mid-May, DO dropped to less than 2 mg/l in all the above tributaries resulting in the fish and crab kills.

The second dinoflagellate bloom occurred in Jackson Creek in Westmoreland County and Cod Creek in Northumberland County during the second week of June. The dominant alga was Gyrodinium galatheanum, a *Pfiesteria*-like organism. Both creeks experienced multi-species fish kills of more than 2000 fish, and had DO levels less than 1 mg/l during the kills. Both of these waterbodies were very shallow which would promote dense algal growth and subsequent complete DO loss when the bloom died.

The third fish kill was reported in Lodge Creek, a tributary of the Yeocomico River, on August 4. Menhaden were swimming erratically and being eaten by birds. Many of the fish had frank lesions. DO was 1 to 2 mg/l deeper in the water column. The water was reddish brown in color, and the dominant dinoflagellate was *Gymnodinium sanguineum*, a non *Pfiesteria*-like organism.

- **Probabilistic Biomonitoring and Chemical Monitoring Program in Virginia Non-Tidal Streams**

PRO sampled 15 randomly selected probabilistic non-tidal stream stations in the Piedmont and Coastal Plain ecoregions in the Spring and Fall of 2001. A total of 50 streams ranging in size from first order to sixth order were sampled statewide. The Regional Biologist gathered representative samples of benthic macroinvertebrates, performed comprehensive habitat assessments, and obtained DO, temperature, pH, and conductivity data. Each station was sampled twice, once in the spring and again in the fall. Fall sampling included water quality samples for nutrients, solids, chlorophyll a and fecal coliform bacteria. Hydrolabs were pre- and post-calibrated and maintained according to agency SOPs. The study is proposed to continue for four years, with new stations selected each year. Probabilistic studies answer questions such as "What percentage of Virginia non-tidal streams have impaired benthic communities?" First year results are pending.

- **Tributyltin (TBT), in Sediments of the Tidal Fresh James River below Richmond, VA.**

TBT sediment levels in the tidal fresh James River between Richmond and Hopewell, VA are largely unknown. One sample from near the Richmond City / Chesterfield County line at rivermile 106 in 1998 reached 3.8 ppb. A water sample during dredging near this point in 1999 reached 4 ppb (parts per trillion). One other sediment sample from below Turkey Island Cutoff at rivermile 79.0 in 1999 held 14 ppb TBT. The US Navy derived a TBT sediment screening value of 250 ppb (0.25 ppb) in an analysis of TBT data from San Diego Bay, CA, Norfolk region, VA, Pearl Harbor, HI, Puget Sound, WA, Narragansett Bay, RI and Galveston Bay, TX, based on ecological risk assessment principles.

The study sampled TBT in estuarine river sediments and water from both near-shore and near-channel sites at seventeen (17) locations from rivermile 107 below the mouth of Goode Creek to rivermile 76 off Hopewell, VA, at areas of heavy vessel traffic. Seven (7) water samples were collected at the heaviest areas of ship traffic in this segment. PRO sampled stations once during Summer/Fall 2000. Virginia Institute of Marine Science (VIMS) research staff performed the TBT analysis.

**Results:** TBT ranged from below the detection limit of 0.5 ppb dry weight in sediment up to 8 ppb for the sediment sample at the Port of Richmond (Deepwater Terminal). No water samples contained detectable TBT. The detection limit in water was 1 ng/l (pptr). VIMS research staff did not consider these levels high for areas that see heavy vessel traffic. However it is not known whether these levels pose a risk to aquatic life.

Station	Description	sed. ppb	water, pptr
2-JMS106.40	Embayment Below Buoy 168 Site 1	0.54	ND
	Duplicate	0.76	ND
2-JMS106.40	Embayment Below Buoy 168 Site 2	0.67	
2-JMS106.40	Embayment Below Buoy 168 Site 3	ND	
2-JMS106.40	Embayment Below Buoy 168 Site 4	0.76	
2-JMS106.40	James R channel edge Below Buoy 168	ND	
2-JMS106.90	0.5 mi US Embayment Below Buoy 168	0.71	
2-JMS105.90	0.5 mi DS Embayment Below Buoy 168	1.72	
2-JMS104.58	Off Deepwater Terminal	8.06	ND
2-JMS105.08	0.5 mi US Deepwater Terminal	ND	
	Duplicate	ND	
2-JMS104.08	0.5 mi DS Deepwater Terminal	3.56	
2-JMS078.99	Off Buoy 126 DS Turkey Is. Cutoff	2.57	ND
2-JMS079.49	0.5 mi US Buoy 126	4.32	
2-JMS078.49	0.5 mi DS Buoy 126	1.66	
2-JMS077.14	Off Hopewell, above Buoy 110	6.13	ND
2-JMS077.64	0.5 mi US Hopewell, VA	0.64	
2-JMS076.64	0.5 MI DS Hopewell, VA	1.07	
2-JMS157.28	James River at Cartersville Rt. 45	ND	ND

- **Water Quality Upstream and Downstream of Permitted and Proposed Livestock Facilities in PRO**

There were 27 permitted VPG and VPA livestock facilities in PRO with greater than 1000 hogs or 200 cattle planned or on-site when this program started in 1997. Water quality data above and below these sites was sparse. Occasional pollution responses and rare coincidental location of Ambient Water Quality monitoring stations nearby provided the only current data near these facilities.

PRO staff obtained surface water grab samples for BOD and TSS, a nutrient scan for nitrogen and phosphorus species, and fecal coliform bacteria during each station visit. Dissolved oxygen, pH, water temperature, and conductivity data were collected by Hydrolab at each station visit. A total of 78 stations have been monitored during the course of the study. Most facilities had one upstream and one downstream station, however some facilities were geographically located so that upstream or downstream stations were not possible. Multiple upstream or downstream stations were selected where appropriate. All stations were monitored every other month, pending staff availability. Monthly monitoring was not logistically feasible due to the large number of stations.

If sample results identified water quality problems or standard violations related to particular facilities, these facility stations were additionally monitored during storm runoff events to document any ammonia, fecal coliform, or dissolved oxygen standard violations off-site, or any other permit violations. Field duplicate samples were collected at one station per run, to cover 10 percent of samples for each parameter. Hydrolabs were pre- and post-calibrated and maintained according to agency SOPs.

This study has identified many impaired stream segments since 1997. However, the impairment often occurred at both the upstream and downstream stations related to a facility. Thus determining causes of impairment were often difficult. The study is scheduled to continue at least through July 1, 2002, and is re-scheduled annually pending staff and resource availability.

- **DEQ Actions Relative to Defense Supply Center (DSCR)**



The Defense Supply Center of Richmond (DSCR), is a large federal material storage and distribution facility that is subject to numerous state and federal environmental laws and regulations. The Virginia Department of Environmental Quality (DEQ) interacts with this facility on a regular basis to assure that all applicable environmental rules are complied with. In addition, this facility has an active Superfund project to contain and clean up contamination from past operations on the site.

Due to recent newspaper stories about this facility, and the corresponding increase in public concern, the DEQ has taken several steps to address these concerns. In addition, DEQ continues to implement its normal compliance programs, and has taken appropriate actions to address problems when they are found. Following is a summary of recent actions taken by DEQ relative to the DSCR.

#### Water Quality Monitoring

Upon learning of public concerns about TCE (trichloroethylene) contamination in water leaving the site, DEQ staff collected water samples in cooperation with DSCR in May of this year. Samples were taken from an onsite stormwater pipe, and from the small stream (referred to as No Name Creek) that receives runoff from the DSCR facility. Analysis of the samples indicated low levels of TCE and some other contaminants, however, the concentrations were well below any established human health risk levels. Additional water samples have been taken in the area to verify that contaminant levels are below human health risk levels. **To date, no water sampling data has shown contamination at a level that would represent a threat to public health.**

#### Biological Stream Evaluation

A good indicator of pollution in a stream is the amount and diversity of aquatic life that exists there. A biological stream assessment was recently conducted in No Name Creek by a DEQ aquatic biologist. His findings indicated that the stream had aquatic organisms that were typical for a small stream in an urban area. There was no indication of unusual biological impacts.

#### Petroleum Release Investigation

Low levels of petroleum contamination have been found in a storm sewer pipe passing through DSCR and discharging into Kingsland Creek. Recent testing has determined the likely source of contamination to be fuel oil that may have leaked or spilled from an old underground storage tank that was removed in 1991. A plan for cleaning up the contaminated area has been developed and will be implemented soon. In the meantime, oil absorbent pads are being maintained in the storm sewer to minimize the release of contaminated water to the creek. The DEQ will continue to monitor DSCR's efforts to eliminate the source of the contamination and will assure that all appropriate actions are taken as required under the law.

#### Untreated Groundwater Release Investigation

On July 17, 2001, DSCR reported a release of untreated groundwater from their Superfund treatment system due to a mechanical failure. It is estimated that approximately 95,000 gallons of contaminated groundwater were released to No Name Creek from June 30 – July 6, 2001. The concentration of TCE in the released water was likely between 50 – 500 parts per billion. That would amount to from 0.04 – 0.4 lbs. of TCE. While it is possible that regulatory standards for TCE were exceeded in the stream during the period of the discharge, human health risk is considered low due to the temporary nature of the event. On Wednesday, October 7, 2001, DSCR reported a second release during an attempt to restart the upgraded pumping and treatment system. This time only about 600 gallons were released. The volume and probable concentration of contaminants is not considered a significant risk to human health or the environment. DEQ will continue its investigation and will take appropriate enforcement action.

#### Special Stream Study

Because of the concern expressed by local residents, DEQ has planned a special study to determine whether there is unusual contamination in No Name Creek due to stormwater runoff. The study will involve taking water samples from the stream during and immediately following rainfall events, and testing for bacterial contamination, TCE and other contaminants. Special tests will be performed to determine if any bacteria found in the samples comes mostly from animal or human sources. Local residents may be requested to provide access to their septic systems to aid in this part of the study. If contaminant levels in the stream exceed state water quality standards, the stream will be added to the state list of impaired waters and addressed through programs established under the federal Clean Water Act. The lack of significant rainfall has prevented any significant progress in this study this fall.

#### Hazardous Waste Enforcement Action

DSCR has a permit to store hazardous waste on site. The DEQ regularly inspects for compliance with that permit. During a May 2000 inspection, DEQ staff found several technical permit violations and cited them in a Notice of Violation issued in June 2000. The violations consisted mainly of procedural problems that were quickly corrected. There were no releases of hazardous chemicals to the environment. Recently, DEQ and DSCR completed negotiations for a Consent Order that required DSCR to pay a fine of \$16,000. This order has been signed and the penalty has been paid.

#### Public Health Consultation Request

In response to recent newspaper accounts of citizen health problems and concerns in the vicinity of DSCR, the DEQ has requested the federal Agency for Toxic Substances and Disease Registry (ATSDR) to conduct a current public health consultation. The ATSDR had previously conducted a public health assessment of this area in 1993 as part of the Superfund project evaluation. No substantial correlation between the contaminated site and any public health effects were found at that time. The Chesterfield County Health Department is conducting a separate health study now, and will cooperate with any studies undertaken by ATSDR. The ATSDR must get funding authorization to fully undertake a study. However, they are already gathering data with the assistance of other agencies.

- **Poly-chlorinated Terphenyls and PCBs in Bailey and Cattail Creeks, Hopewell, VA, 1997-99**

The Piedmont Regional Office (PRO) of DEQ performed a special study from October 1997 to September 1999 to identify the source of poly-chlorinated terphenyls (PCTs) and PCBs in Bailey Bay and Creek, Hopewell, VA. DEQ initiated the study after regularly scheduled sediment sampling for organics and metals on March 6, 1997 revealed the presence of PCTs at 26.7 ppm in sediments at the Rt. 10 bridge on tidal Bailey Creek. This compound was previously unknown in PRO.

The study plan was to sample sediments in the James River, Bailey Bay and Creek, and other nearby tributaries, analyze the initial sampling results, and perform follow-up sampling surrounding the areas of highest contamination to "track" the source. PRO initially sampled 27 stations in the James River, Appomattox River, Cabin Creek, Poythress Run, Gravelly Run, Bailey Bay, Bailey Creek, Tar Bay and Cattail Creek in October and November 1997.

Of those stations, tidal Cattail Creek and Bailey Creek below Cattail Creek had the highest PCT levels, and nontidal Bailey Creek contained no detectable PCT. The second tier of samples in April 1998 concentrated on eight stations on Cattail Creek and its tributaries. These sediment samples pointed to an unnamed tributary of Cattail Creek that flowed through an old abandoned landfill, with the highest PCT level at 735 ppm.

At this point DEQ contacted EPA Superfund staff, who indicated interest in sampling the old landfill for PCTs and PCBs. EPA CERCLA Assessment staff sampled sediments and soils at 14 sites in the unnamed tributary to Cattail Creek and in the old landfill in January 1999. Sediment samples pointed to a portion of the unnamed tributary above the old landfill, and also indicated levels of PCT and PCB in the landfill were well below the EPA Superfund level requiring cleanup of 50 ppm.

DEQ performed a third tier of sampling in May 1999 at five stations in the most upstream areas of the unnamed tributary and in Poythress Run in November 1999 to confirm a PCB finding in sediments there in 1997. These PCT results found in the unnamed tributary to Cattail Creek, ranged from 1.4 to 5.2 ppm but did not meet the EPA Superfund requirement for cleanup. The Poythress Run sample also revealed a low level of PCBs below the EPA cleanup level.

#### **VALLEY REGIONAL OFFICE (VRO)**

- **South River Science Team**

Since November 2000, the DEQ Valley Regional Office has been participating in a unique partnership with industry, other state agencies, local officials, academia, and citizen groups. This group is referred to as the South River Science Team. The overall goal of this group is to look beyond the routine long-term mercury monitoring conducted in the South River by DEQ. Areas of focus include filling data gaps,

reviewing new technologies, addressing outstanding risk-based questions, evaluating the potential for remediation, and ensuring that there is effective communication between stakeholders. The South River Science Team is a cooperative effort between DuPont; Virginia Departments of Environmental Quality, Health, and Game and Inland Fisheries; Academia; and Citizen Advocates. The concept for the Science Team was initially presented to DEQ in November 2000 by DuPont. Early on, it became clear that the interactions of science team members opened a productive dialog between the many stakeholders in the South River Mercury Monitoring Project. In addition to the sharing of knowledge and information on historic work and other studies, the communication between members of the Science Team has led to excellent working relationships between a diverse group of individuals and organizations. It has also led to “thinking outside the box,” as knowledge and experiences are shared by team members and guests.

Highlights of the Science Team during 2001 include:

- Ongoing dialog between the diverse stakeholders involved with South River and Shenandoah River mercury monitoring, through meetings or conference calls at least once every two months.
- Compilation of all reports and all data related to mercury in South River and downstream waters, including extensive statistical review and discussions, particularly for fish tissue data.
- Press releases to update the public on fish tissue results, including a public meeting in Harrisonburg in March 2001, with participation by VDH, DEQ, VDGIF, and DuPont.
- Attendance by DEQ and DuPont staff at EPA National Mercury Conference in May 2001.
- A productive meeting between key Science Team members and the primary author of several historic reports on South River mercury.
- Fish tissue trend assessment presentations and discussions, and many recommendations for further work and data gathering.
- Invitation and support from DuPont to several nationally-recognized experts on mercury issues, culminating in an October 2001 meeting between three prominent experts and the full Science Team and a sharing of new ideas and approaches for evaluating mercury in the South River and downstream areas.
- Initiation of further research to help address data gaps and areas not considered in previous studies, including a fish food organism study (contracted by DuPont to Virginia Tech), a “mud mapping” project to identify sediment depositional areas, which may be keys to future mercury cleanup or removal efforts in the South River, and intensive, closely-spaced water column sampling to evaluate whether there may be ongoing inputs of mercury into the system.
- Collaborative development of monitoring plans for fish, sediment, and water, with an emphasis on source detection, risk analysis, and potential remediation options.

DEQ and the other partners in the Science Team look forward to 2002 and beyond, as the team addresses new concerns, enhances communications, and ensures that the citizens of the Commonwealth remain well informed of the status and risks associated with mercury contamination in the Shenandoah River drainage.

### **SOUTH CENTRAL REGIONAL OFFICE (SCRO)**

The South Central Regional Office (SCRO) was established in Lynchburg in 2001. The regional boundaries for Piedmont and West Central regions were revised to reflect the addition of a new region. The South Central Region serves the counties of Amherst, Appomattox, Buckingham, Campbell, Charlotte, Cumberland, Halifax, Lunenburg, Mecklenburg, Nottoway, Pittsylvania and Prince Edward as well as the cities of Danville and Lynchburg.

SCRO water program staff have begun monitoring, assessment, permitting, inspection, and compliance functions. The following are recent SCRO activities:

- **Probabilistic Biomonitoring and Chemical Monitoring Program in Virginia Non-Tidal Streams**

The South Central Regional Office (SCRO) does not have a dedicated biologist at this time. SCRO staff supported the PRO and WCRO regional biologists in sampling 10 probabilistic non-tidal stream stations in the Southeastern Plain and Central Appalachian Ridges and Valley ecoregions. Staff gathered

representative samples of benthic macroinvertebrates, performed comprehensive habitat assessments, and obtained DO, temperature, pH, and conductivity data at 10 stations located in SCRO. Each biological station was sampled twice, once in the spring and again in the fall. Fall sampling included water quality samples for nutrients, solids, chlorophyll a and fecal coliform bacteria. All sampling was conducted in accordance with agency standard operating procedures for ensuring the quality of the data. Probabilistic stations are preselected for a five-year cycle; the current cycle began in 2001.

- **Total Maximum Daily Load (TMDL) Activities**

Highlights of the SCRO efforts to improve water quality in those streams segments that do not currently support designated beneficial uses are presented below.

A fecal coliform bacteria TMDL has been developed for Willis River in Cumberland county. The TMDL has been completed and submitted to the U.S. Environmental Protection Agency (EPA) for review.

Public meetings were held in the Willis River watershed to inform the public and encourage participation in the TMDL development and implementation process. An extensive mailing list was developed and used to help notify watershed stakeholders of upcoming meetings. In addition to elected officials, representatives from citizen monitoring groups, the agriculture community, landowners, and other state agencies were in attendance. Local radio stations, newspapers, and the Peter Francisco Soil and Water Conservation District provided publicity notices in an effort to keep stakeholders involved.

Two investigations were related to the Willis TMDL but were not formally incorporated into the TMDL development. One such investigation was conducted on the Willis River and its tributaries following citizen complaints of illegal dumping in the watershed. Dissolved oxygen measurements were taken and water samples were analyzed for fecal coliform.

DEQ has also coordinated with VDACS and USDA on a study of the feral pig population in the Willis River watershed, following citizen complaints of damage caused by the pigs.

Both of these investigations are ongoing. Publicity about the Willis River TMDL may have motivated citizens to contact DEQ with these complaints.

The results of these studies will be utilized in the implementation plan for the Willis River TMDL.

- **Special Study on Ash Camp Creek**

Ash Camp Creek is listed on the 303(d) list for benthic impairment from the Route 654 bridge to the confluence with Roanoke Creek. This has historically been attributed to discharges from the Keysville Sewage Treatment Plant (STP) and the former West Point Pepperell plant (discharge terminated in early 1990's). Stream surveys were performed in the fall of 2001. The collected data will help to ascertain the contributions from point and non-point sources of pollution to the benthic impairment of Ash Camp Creek.

- **Coordination with Citizen Monitoring**

Representatives from SCRO met with representatives of the James River Association, Clean Virginia Waterways and DEQ's Citizen Monitoring Coordinator at Longwood College. The meeting established dialogue between new office staff and citizen monitoring groups. The groups are eager to assist with stream monitoring and are working to extend their monitoring capabilities. Staff input was welcomed for future monitoring sites to be used in future water quality assessments. SCRO anticipates a productive relationship with these and other local citizen monitoring groups.

- **Public Presentations**

During the first year in which the SCRO performed functions related to water quality, SCRO water staff presented a variety of programs to local schools and organizations. A presentation on stream and lake monitoring was given to honors students at Brookside Middle School in Lynchburg. The students had concluded a special unit investigating water quality indicators. After a well-received presentation, the

monitoring staff was asked a variety of insightful questions regarding major sources of stream impairment and sound environmental practices.

SCRO water staff were featured as speakers at meetings of the Virginia Water Environment Association, the Association of American University Women, and the YWCA of Central Virginia. The presentations addressed public concerns about water quality issues and TMDLs.

- **Brominated Diphenyl Ether Investigation**

Brominated Diphenyl Ether (BDE) is a persistent bioaccumulative toxic that has recently received national attention. BDEs are used as flame retardants and are present in clothing and upholstery. A special study was conducted by Virginia Institute of Marine Science (VIMS) in fall 2001 to collect data on the levels of BDEs in the Hyco River near the Virginia/North Carolina state line. SCRO staff will support future BDE studies as more information becomes available about BDEs and their effects.